Claims

1. A bone-enhancing composite comprising synthetic apatite and at least one supplementary bioactive agent selected from a biocompatible polymer and an anti-resorption agent added *ab initio*, wherein the synthetic apatite comprises ionic calcium, phosphate, carbonate and at least one amino acid in monomeric or polymeric form.

2. The bone-enhancing composite according to claim 1 wherein the biocompatible polymer is selected from a natural biocompatible polymer and a synthetic biocompatible polymer.

3. The bone-enhancing composite according to claim 2 wherein said natural polymer is a polysaccharide.

4. The bone-enhancing composite according to claim 3 wherein said polysaccharide is a glycosaminoglycan.

5. The bone-enhancing composite according to claim 4 wherein said glycosaminoglycan is heparin or a heparin derivative.

6. The bone-enhancing composite according to claim 1 further comprising at least one therapeutic agent.

7. The bone-enhancing composite according to claim 6 wherein the at least one therapeutic agent is selected from the group consisting of antibiotics, antiviral agents, chemotherapeutic agents, anti-rejection agents, analgesics and analgesic combinations, anti-inflammatory agents, hormones, growth factors and cytokines.

8. The bone-enhancing composite according to claim 7 wherein said at least one therapeutic agent is a growth factor.

9. The bone-enhancing composite according to claim 8 wherein said growth factor is a fibroblast growth factor or an active fragment or variant thereof.

10. The bone-enhancing composite according to claim 1 wherein said synthetic apatite is a poorly crystalline apatite.

11. The bone-enhancing composite according to claim 1 wherein said synthetic apatite is a poorly crystalline apatite and said at least one supplementary bioactive agent is heparin or a heparin derivative.

12. The bone-enhancing composite according to claim 11 further comprising fibroblast growth factor or an active fragment or variant thereof.

13. The bone-enhancing composite according to claim 1 wherein the anti-resorptive agent is a bisphosphonate or a pharmaceutically acceptable salt or ester thereof.

14. The bone-enhancing composite according to claim 10 wherein said poorly crystalline apatite has an X-ray diffraction pattern comprising a peak at a 2 theta value of about 26° and an undifferentiated peak at 2 theta values of about 31° to about 33°.

15. A pharmaceutical composition comprising a bone enhancing composite, the bone enhancing composite comprising synthetic apatite and at least one supplementary bioactive agent selected from a biocompatible polymer and an anti-resorption agent added *ab initio*, wherein the synthetic apatite comprises ionic calcium, phosphate, carbonate and at least one amino acid in monomeric or polymeric form, and a pharmaceutically acceptable carrier or diluent.

16. A pharmaceutical composition according to claim 15 wherein the biocompatible polymer is selected from a natural biocompatible polymer and a synthetic biocompatible polymer.

17. A pharmaceutical composition according to claim 16 wherein said natural polymer is a polysaccharide.

18. A pharmaceutical composition according to claim 17 wherein said polysaccharide is a glycosaminoglycan.

19. A pharmaceutical composition according to claim 18 wherein said glycosaminoglycan is heparin or a heparin derivative.

20. A pharmaceutical composition according to claim 15 further comprising at least one therapeutic agent.

21. A pharmaceutical composition according to claim 20 wherein the at least one therapeutic agent is selected from the group consisting of antibiotics, antiviral agents, chemotherapeutic agents, anti-rejection agents, analgesics and analgesic combinations, anti-inflammatory agents, hormones, growth factors and cytokines.

22. A pharmaceutical composition according to claim 21 wherein said at least one therapeutic agent is a growth factor.

23. A pharmaceutical composition according to claim 22 wherein said growth factor is a fibroblast growth factor or an active fragment or variant thereof.

24. A pharmaceutical composition according to claim 15 wherein said synthetic apatite is a poorly crystalline apatite.

25. A pharmaceutical composition according to claim 15 wherein said synthetic apatite is a poorly crystalline apatite and said at least one supplementary agent is heparin or a heparin derivative.

26. A pharmaceutical composition according to claim 15 further comprising fibroblast growth factor or an active fragment or variant thereof.

27. A pharmaceutical composition according to claim 15 wherein the anti-resorptive agent is a bisphosphonate or a pharmaceutically acceptable salt or ester thereof.

28. A pharmaceutical composition according to claim 24 wherein said poorly crystalline apatite has an X-ray diffraction pattern comprising a peak at a 2 theta value of about 26° and an undifferentiated peak at 2 theta values of about 31° to about 33°.

29. A method for treating orthopedic, periodontal and craniofacial indications comprising administering to a subject in need thereof a therapeutically effective amount of a composition comprising synthetic apatite and at least one supplementary bioactive agent selected from a biocompatible polymer and an anti-resorption agent added *ab initio*, wherein the synthetic apatite comprises ionic calcium, phosphate, carbonate and at least one amino acid in monomeric or polymeric form.

30. The method according to claim 29 wherein the biocompatible polymer is selected from a natural biocompatible polymer and a synthetic biocompatible polymer.

31. The method according to claim 30 wherein said natural polymer is a polysaccharide.

32. The method according to claim 31 wherein said polysaccharide is a glycosaminoglycan.

33. The method according to claim 32 wherein said glycosaminoglycan is heparin or a heparin derivative.

34. The method according to claim 29 further comprising at least one therapeutic agent.

35. The method according to claim 34 wherein the at least one therapeutic agent is selected from the group consisting of antibiotics, antiviral agents, chemotherapeutic agents, anti-rejection agents, analgesics and analgesic combinations, anti-inflammatory agents, hormones, growth factors and cytokines.

36. The method according to claim 35 wherein said at least one therapeutic agent is a growth factor.

37. The method according to claim 36 wherein said growth factor is a fibroblast growth factor or an active fragment or variant thereof.

38. The method according to claim 29 wherein said synthetic apatite is a poorly crystalline apatite.

39. The method according to claim 29 wherein said synthetic apatite is a poorly crystalline apatite and said at least one supplementary bioactive agent is heparin or a heparin derivative.

40. The method according to claim 39 further comprising fibroblast growth factor or an active fragment or variant thereof.

41. The method according to claim 29 wherein the anti-resorptive agent is a bisphosphonate or a pharmaceutically acceptable salt or ester thereof.

42. The method according to claim 38 wherein said poorly crystalline apatite has an X-ray diffraction pattern comprising a peak at a 2 theta value of about 26° and an undifferentiated peak at 2 theta values of about 31° to about 33°.

43. Use of a composite comprising synthetic apatite and at least one supplementary bioactive agent selected from a biocompatible polymer and an anti-resorption agent added *ab initio*, wherein the synthetic apatite comprises ionic calcium, phosphate, carbonate and at least one amino acid in monomeric or polymeric form, for the manufacture of a bone-enhancing medicament.

44. Use according to claim 43 wherein the biocompatible polymer is selected from a natural biocompatible polymer and a synthetic biocompatible polymer.

45. Use according to claim 44 wherein said natural polymer is a polysaccharide.

46. Use according to claim 45 wherein said polysaccharide is a glycosaminoglycan.

47. Use according to claim 46 wherein said glycosaminoglycan is heparin or a heparin derivative.

48. Use according to claim 43 further comprising at least one therapeutic agent.

49. The method according to claim 48 wherein the at least one therapeutic agent is selected from the group consisting of antibiotics, antiviral agents, chemotherapeutic agents, anti-rejection agents, analgesics and analgesic combinations, anti-inflammatory agents, hormones, growth factors and cytokines.

50. The method according to claim 49 wherein said at least one therapeutic agent is a growth factor.

51. The method according to claim 40 wherein said growth factor is a fibroblast growth factor or an active fragment or variant thereof.

52. The method according to claim 42 wherein said synthetic apatite is a poorly crystalline apatite.

53. The method according to claim 52 wherein said synthetic apatite is a poorly crystalline apatite and said at least one supplementary bioactive agent is heparin or a heparin derivative.

54. The method according to claim 53 further comprising fibroblast growth factor or an active fragment or variant thereof.

55. The method according to claim 42 wherein the anti-resorptive agent is a bisphosphonate or a pharmaceutically acceptable salt or ester thereof.

56. The method according to claim 52 wherein said poorly crystalline apatite has an X-ray diffraction pattern comprising a peak at a 2 theta value of about 26° and an undifferentiated peak at 2 theta values of about 31° to about 33°.

57. A method of preparing a bone enhancing composite comprising the steps of:

a) preparing a liquid mixture comprising ionic calcium, phosphate, at least one amino acid in either monomeric or polymeric form, carbonate, at least one supplementary bioactive agent selected from a biocompatible polymer and an anti-resorptive agent, optionally further comprising a therapeutic agent;

b) subjecting said mixture to microwave irradiation;

c) quenching said irradiated mixture;

d) filtering said quenched mixture so as to separate between the filtrate and a cake;

e) drying said cake;

f) grinding said cake into a powder.

58. The method according to claim 57 further comprising the following steps:

g) sterilizing said powder;

h) wetting said sterilized powder with a solution optionally comprising at least one therapeutic agent;

i) preparing said wetted powder for administration.

59. The method according to claim 57 wherein the biocompatible polymer is selected from a natural biocompatible polymer and a synthetic biocompatible polymer.

60. The method according to claim 59 wherein said natural polymer is a polysaccharide.

61. The method according to claim 60 wherein said polysaccharide is a glycosaminoglycan.

62. The method according to claim 61 wherein said glycosaminoglycan is heparin or a heparin derivative.

63. The method according to claim 57 further comprising at least one therapeutic agent.

64. The method according to claim 63 wherein the at least one therapeutic agent is selected from the group consisting of antibiotics, antiviral agents, chemotherapeutic agents, anti-rejection agents, analgesics and analgesic combinations, anti-inflammatory agents, hormones, growth factors and cytokines.

65. The method according to claim 64 wherein said at least one therapeutic agent is a growth factor.

66. The method according to claim 65 wherein said growth factor is a fibroblast growth factor or an active fragment or variant thereof.

67. The method according to claim 57 wherein said synthetic apatite is a poorly crystalline apatite.

68. The method according to claim 57 wherein said synthetic apatite is a poorly crystalline apatite and said at least one supplementary bioactive agent is heparin or a heparin derivative.

69. The method according to claim 68 further comprising fibroblast growth factor or an active fragment or variant thereof.

70. The method according to claim 57 wherein the anti-resorptive agent is a bisphosphonate or a pharmaceutically acceptable salt or ester thereof.

71. The method according to claim 67 wherein said poorly crystalline apatite has an X-ray diffraction pattern comprising a peak at a 2 theta value of about 26° and an undifferentiated peak at 2 theta values of about 31° to about 33°.